REMARKS

Claim 8 having been withdrawn from consideration, Claims 1 through 7 are now presented for examination. Claim 1 has been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. Claim 1 is the only independent claim.

Claims 1 through 6 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,141,596 (Hawkins et al.). Claim 7 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Hawkins et al. With regard to the claims as currently amended, these rejections are respectfully traversed.

Independent Claim 1 as currently amended is directed to a method of making a through hole in a silicon substrate in which a high-impurity concentration region is formed that continuously surrounds the periphery of a through-hole-forming region. An etching stop layer is formed over the through-hole-forming region and the high-impurity-concentration region. A mask layer having an opening on a second surface of the silicon substrate is formed. The second surface is opposite the first surface. The silicon substrate is etched at the opening through the mask layer until the etching stop layer is exposed to the second surface. The silicon substrate is further etched until the etched portion extends to the high-impurity-concentration region and the etching stop layer is removed at least at the portion exposed to the second surface.

In Applicant's view, Hawkins et al. discloses arrangements to fabricate an integral filter by patterning a layer of etch resistant material on one side of a (100) silicon wafer to produce an array of equally spaced, uniformly sized posts or shapes and doping the exposed

surface of the wafer by boron ion implant. The dopant is diffused into the wafer while the array of posts of etch resistant material masks the diffusion under them. The size of the posts or shapes determines the undoped areas of the wafer and, thus, the mesh size of the eventually produced integral filter. The wafer is recoated with a layer of etch resistant material and the other side, which was not doped, is patterned to form a plurality of sets of elongated channel vias and reservoir vias, one reservoir via for each set of channel vias. The wafer is orientation dependently etched for a predetermined time period to produce the sets of channel grooves and reservoir recesses, the recesses having a depth of about 75-85% of the wafer thickness, followed by etching of the wafer in an EDP etchant to finish etching the reservoirs through the wafer. The doped silicon area is not etched, so that an integral filter is produced having an arbitrary pore size determined by the size of the posts or shapes patterned initially prior to the diffused doping step.

According to the invention of Claim 1 as currently amended, a high-impurity-concentration region that continuously surrounds the periphery of a through-hole-forming region is formed at a first surface of a silicon substrate. Advantageously, the continuous surrounding of the through-hole region by the high-impurity-concentration region substantially improves the positional accuracy of the through hole and the yield of the through holes.

Hawkins et al. may teach forming a through-hole (24) in a silicon substrate. In Hawkins et al., a rectangular array of posts (22) on one surface of a silicon substrate are used to form a rectangular array of etch stops 30 which provide a grid of openings (28). The grid of openings operate as an integral filter for ink in the ink inlet for a printhead reservoir. As

clearly shown in Fig. 9 of Hawkins et al., the patterned etch stops 30 of Hawkins et al. are set intermittently. Such intermittently set etch stops are well adapted to form a filter but do not provide accurate positioning for a through-hole.

In contrast to Hawkins et al.'s intermittent etch stops that provide a filter structure, it is a feature of Claim 1 that the high-impurity-concentration region at the first surface of a silicon substrate continuously surrounds the periphery of a through-hole forming region to accurately position the through hole. Accordingly, it is not seen that Hawkins et al.'s intermittently set etch stops for use as an integral filter in any teaches or suggests the feature of Claim 1 of a high-impurity-concentration region continuously surrounding a through hole region to provide accurate positioning. It is therefore believed that Claim 1 as currently amended is completely distinguished from Hawkins et al. and is allowable.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record. Applicants submit that the amendments to independent Claim 1 clarify Applicant's invention and serve to reduce any issues for appeal.

The other claims in this application are each dependent from the independent claim discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application. The Examiner is respectfully requested to enter this Amendment After Final Action under 37 C.F.R. § 1.116.

Applicant's attorney, Douglas W. Pinsky, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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